

620.00 PLANTING

Landscaping, wetland mitigation and wild flowers plantings are several areas where construction personnel may become involved with planting vegetation. With the present day emphasis on the environment, beautification, and aesthetics, the department must obtain the best possible results wherever these projects occur.

Landscaping and Wetlands

The Senior Environmental Planner in the District, who usually has landscape and planting experience, should be consulted and involved with the project early in design and at the time of planting. Projects with landscaping and/or wetland mitigation typically contain contract specifications with a minimum plant establishment period, usually one year. Refer to Standard Drawing K-7 to review the recommended practices and procedures for planting trees and shrubs.

Trees and shrubs come in various forms i.e., containerized, balled, bare root, and cuttings. The various types of plants require special attention in both in handling and planting. Prior to planting, a thorough examination should be done on all trees, shrubs, grass seed, etc. to assure that the vegetation complies with design specifications.

After planting, routine periodic inspections should be conducted by appropriate District personnel to assure planting and growth success. Plants found to be dead or damaged should be replaced as soon as possible. Plant replacement should not be postponed to the end of the establishment period. A written report on the inspection should be prepared and forwarded to the District Engineer so corrective action, if necessary, can be taken. Use the ITD-1406, Construction Inspection Report, for this procedure.

Wild Flowers

The Surface Transportation and Uniform Relocation Assistance Act of 1987 mandates the planting of wild flowers in association with landscaping projects. The department's policy is to comply with the wild flower requirements in a positive manner on all landscape projects. The minimum acceptable amount is 1/4 or 1% of the **final** landscaping cost. Any addition to the overall landscape cost will result in an increase in the wild flower seeding and/or planting. The location of any additional wild flower plantings shall fit in with the overall scheme of the landscaping plan and realistically only involves those projects with a landscape design plan such as is found in rest area plans, certain urban projects, etc.

A landscaping project is defined as, "any action taken as part of a highway construction project or as a separate action to enhance the aesthetics of a highway through the placement of plant materials consistent with a landscape design plan." All work performed in association with the landscaping action is to be included in the total landscaping expenses.

Guidance information has been included in the Design manual and provisions for the wild flower plantings will be in each landscape project unless a waiver has been obtained.

The department is required to report compliance to FHWA each year by detailing the total landscape costs and costs of the wild flower planting on each project. When the contract is completed and costs are available, the details shall be sent directly to the Roadside Services Manager in the Maintenance section.

Documentation For Pay Quantities

The diary shall be used to verify the activity, date, and location of the work. Quantities will also be documented by diary entry.

Reports

- Construction Inspection Report
- FHWA Compliance Report

621.00 SEEDING

The procedures and guidance for ordering seed, seedbed preparation, rate of seeding, drill seeding, broadcast seeding, and basis of payment for seeding items is covered in the following information.

Seed Supply and Ordering

Most seed is available through the P&MM Central Supply. The Resident Engineer or an authorized employee should prepare an **unnumbered** ITD-2379, Supply Request and route the form to the District Supply Operations Supervisor. Seed is furnished to the contractor at no cost. Use the following guidelines, when preparing an order:

- Use one ITD-2379 form for ordering seed and do not include any other items except seed on this same form. Use a separate ITD-2379 for each project.
- On the ITD-2379, fill in work authorization number, function code SF, activity code CO44, and insert the proper rule code for all projects on the state or local systems. Provide project name and number under Comments.
- Calculate the pounds of each kind of grass and legume seed needed and add 10%. Round quantities for each kind of grass to multiples of 22.68 kg (50 lbs.) and legume to 11.35 kg (25 lbs.). Record these quantities on the ITD-2379.
- When native seeds are specified, contact the Roadside Services Manager in the headquarters Maintenance section for assistance in selection of kinds and quantities. Place pounds of each kind of native seed needed on the form following the grass and legume seed list. Quantities of native seed will be calculated to multiples of 2.27 kg (5 lbs) in most instances.
- Use the correct name and identification symbols, as shown in the Design manual and the supply record listing. Do not insert ITD catalog numbers.
- Give your best estimate as to date by which you need the seed delivered. Order seed at least 30 days in advance of the date delivery is desired so as to be sure of getting it in time. Allowing more time would be better but do not order more than three months ahead of time.
- After completing the information on the unnumbered ITD-2379, except for Supply Catalog numbers, route the ITD-2379 to the District Supply Operations Supervisor. The District Supply Operations Supervisor will send the order to the Roadside Services Manager for approval, retaining a copy for District Supply files. The Roadside Services Manager assigns a K document number on the ITD-2379 and sends to P&MM for data entry. The Roadside Services Manager will return copies of the ITD-2379 to the District Supply Operations Supervisor and Resident Engineer after approving the form.
- Return all unused seed that is unopened, in the original bags, and properly labeled to District Supply. A credit will be made back to the original purpose code charging the project, and the District Supply General Inventory Account will be debited. Do not return mixed seed. Do not return bags of unmixed seed that have been opened. Leftover mixed seed or bags of unmixed seed that have been opened are to be transferred to the District Maintenance section. Document the quantities transferred to Maintenance on an ITD-500, Inter-department Correspondence.

Seedbed Preparation

Seedbed preparation includes weed control and soil tillage as needed for successful sowing of seed. Good seedbed preparation is probably the least understood, most objected to, and the hardest to achieve of any phase of seeding operations; but it also may be the most important. For purposes of seedbed preparation, seeding areas may be separated into five types:

- Rocky (untillable).
- Benched (serrated).
- Very steep (steeper than 2:1).
- Steep (steeper than 3:1 to 2:1).
- Sloping (3:1 or flatter).

In most cases, rocky slopes of any gradient need not be disturbed if there are sufficient cracks for the seed to fall into. The only thing that could be done would be to walk a cleated crawler tractor up and down the slope or something similar to open or create crevices. Motorized sheep foot packers have been used on flatter areas.

Benched or serrated slopes need no preparation, as sloughing of soil from the bench above will tend to cover seed.

Seeding very steep slopes is an extremely difficult problem. However, if seeding is called for on the plans and the slopes are not benched, a reasonably good seedbed may be provided by working a cleated crawler tractor up and down the slopes by use of a winch on another tractor stationed at the top. Cross-slope dragging with a cleated cat track will do a satisfactory job in looser soils.

Steep slopes can be cat-walked up and down in most soils. Cat-walking leaves a good seedbed by firming the loose soil and loosening the hard soil and should be completed immediately ahead of broadcasting the seed on both cut and fill slopes on both very steep and steep slopes.

Sloping areas can be prepared with conventional equipment, such as disc, bull tongs or rippers, and patrol. Fill slopes 3:1 or flatter may not need preparation. However, they do need to be checked for satisfactory condition of firmness and looseness.

On very steep and steep slopes, the soil should be tilled to a 50 mm (2") depth and on sloping areas to a 75 mm (3") depth. On areas to be drilled, soil should be prepared to a condition in which a drill and possibly a crimper disc will function properly. On areas to be broadcast seeded, soil is prepared to provide coverage for the seed by sloughing of the soil and moisture holding by the cross-slope basins.

Weed control included under seedbed preparation is for two reasons: (1) to keep weeds from going to seed and (2) to keep weed growth from interfering with seeding operations. Actually, a little weed growth may be beneficial so long as the above two requirements are met. Weed control should be carried out after it has been determined that complete weed seed germination has taken place but before growth has become so rank that it would interfere with seeding operations or before new weed seeds are produced. If timing is correct, one treatment should be satisfactory. Request assistance in determining whether mechanical or chemical control would be most beneficial and which chemical would be most appropriate.

Normally, weed control should be accomplished during June and July after the last early season rains and before the weeds are in the blooming stage.

Rate of Seeding

Drilling rate involves row spacing and the amount of seed per meter (foot) or row length. The drill rows should be spaced wider than 150 to 175 mm (six or seven inches) since wider spacing allow competition from weeds and prolong stand establishment. Broadcasting rate involves the number of seeds per square meter (foot) of surface area. It is generally acknowledged that broadcast seeding requires more seed per hectare (acre) than drilling. Poor sites (for example, south and west-facing slopes) require more seed than favorable sites; and the upper portions of slopes should receive more seed than the lower areas. More seed is required progressively in the following order of seeding methods: drilling, whirlwind broadcast, hydro-broadcast, and aerial broadcast.

To keep the seeding specifications from becoming too complex and difficult to implement, the rates shown in the Seed Selection of the S&P Manual, Section 14-760.2, were determined so that they would fall between the specific needs of drilling and hydro-broadcast with the thought that most projects would be seeded using this method, and adjustments of rates would be made in the field. The rates shown are approximately 25% heavy for drilling, just right for whirlwind broadcast, 50% light for hydro-broadcast, and 100% light for aerial broadcast. On most projects, the rates given, along with the 10% extra, should provide sufficient seed to make these adjustments; however, a large amount of hydro or aerial broadcast acreage on a project would require additional seed. The number of seeds per kg (lb.) by species, growth habit, and germination and seedling vigor, among other factors, were also considered. The field personnel that are responsible for construction should make the final determination in the field. Careful checking, adjustment, and control of the rates of application can materially improve the final success of seeding.

Following is a table showing the number of seeds required to be applied per square meter (foot), calculated to ensure application of the rates given in the standard mixes (Seed Selection, S&P Manual, Sec. 14-760.2).

Seeding Rate Guide
Seeds per square meter (foot)

		Commercial w/Natives	Commercial w/o Natives
Southern Idaho Type Sites			
Mix #1	Grasses	700 (65)	785 (73)
	Legume	65 (6)	65 (6)
Mix #2	Grasses	660 (61)	730 (68)
	Legume	55 (5)	55 (5)
Northern Idaho Type Sites			
Mix #1	Grasses	1240 (115)	1560 (145)
	Legume	55 (5)	55 (5)
Mix #2	Grasses	19960(182)	2240 (208)
	Legume	195 (18)	195 (18)

This table can be applied to drill seeding as well as broadcast seeding. The native seeds in the mix cannot be used for rate checking, as they are too variable. All that can be done with natives is check to be sure that they are properly distributed while checking the application rate by counting the number of commercial seeds (grass and legume) applied per square meter (foot).

There are several ways of counting the seed applied, however, perhaps the most convenient way is to use a canvas placed on a firm surface in the path of the drill while the drill is carefully drawn over the canvas. Seeds can then be counted in representative square meter (foot) samples on the canvas. The same may be done when broadcasting except that the canvas is placed in the path of the seed as it is being applied to the surface by the broadcast equipment. After determining the number of commercial seeds needed per square meter (foot), to be used as a base according to the table, apply the following judgment factors to arrive at the exact count of seeds needed for improvement of the seed application rate:

- Use the number of seeds required per square meter (foot) as a maximum when checking drill seeding (may be reduced as much as 25% if the seed is needed elsewhere on the project to improve the seeding as described above).
- Use the number of seeds required per square meter (foot) as a minimum when checking broadcast seeding (see increases desired according to method used).
- When broadcast seeding on slopes, especially cut slopes, apply 2/3 of the seed to the upper 1/2 of the slope (gradually increase the rate as seeding progresses up the slope or vice versa).
- Apply more seed to the unfavorable sites as compared to that applied to favorable sites (perhaps as much as a 30% relative variation would be beneficial).
- Adjust the application rate according to the needs of the method used (drilling or broadcasting).
- IF "special use" seeds are included in the mix, consult the Roadside Services Manager in the headquarters Maintenance section for the correct seed count/sq. meter (foot) to use as a base.

As the seeding operation progresses, check the rate more broadly by determining the kg (lbs.) of seed applied to a premeasured area of an hectare (acre) or two. This should be repeated at convenient intervals as the seeding operation progresses. Any mixed seed that is left over after the job is done may be broadcast applied on those areas that would benefit by the application.

Drill Seeding

Proper drilling technique is of major importance in obtaining successful seedlings. Most failures attributable to drilling (and there are a good many) are the result of placing seed too deep or too shallow in the soil or in a situation so that moisture will not accumulate near the seed. Several factors affect this such as: improper seedbed preparation, incorrect disc spring pressure, failure to use depth gauges where needed, drilling speed too fast, drilling when wind is too strong, or using the wrong kind of drill.

The seedbed must be loose enough to allow drill disc penetration but not so loose that depth control is lost. Pressure of the springs on the discs allows considerable control over the penetration, however, in some cases, depth gauges are necessary, as spring adjustment is too limited. Even if the drill is properly adjusted, if it is pulled at a high rate of speed or if there is a high wind, the seed will be left on the surface. This is probably our most serious weakness.

When mulch is not to be used, a double-disc drill is required. The drill is then adjusted and operated in such a manner that the seed is placed at the bottom of small, approximately 50 mm (2") depth, cross-slope furrows with only a thin soil covering. The depth of soil covering the seed immediately after drilling should not exceed 12 mm (1/2 inch). If the furrows are good and seed is **accurately** placed in the **bottom** of the furrow, almost no covering is needed as wind and water will help cover the seed by sloughing of the soil.

When mulch is to be crimped into the soil, the cross-slope furrows should not be deep. They should be just deep enough to hold the seed in place, with maximum soil coverage of 12 mm (1/2"), until the crimping or other mechanical anchoring is completed. The mechanical anchoring action will tend to cover the seed even more.

The goal is to place the seed just under the soil with provision for moisture holding. Both the furrows and the mulch serve to accumulate moisture. Once the drill is adjusted, **watch the speed, wind conditions, and free flowing of spouts**. If the drill happens to not be equipped with an agitator and the seed bridges over, this can be corrected by use of baling wire properly attached in drill box. Keep checking where seed is placed in the soil.

Should there be intermittent rocky areas included in the area to be drill seeded, the drill may be raised when going over the rocks where equipment may be damaged. The advantage of drilling is not present when rocks are too severe; and therefore, nothing is gained by forcing the drilling. If the drill is such that the discs can be raised just enough to clear the rocks and the seed delivery system still remain in gear; this can serve as a broadcast method on these areas. If not, the seed should be broadcast later on the rocky areas by hand or some other broadcast method.

Broadcast Seeding

Broadcast seeding where wood fiber, seed, and fertilizer have been broadcast in one operation has resulted in a very high percentage of failures. The wood fiber attaches so tightly to the soil that the temperature and moisture barrier that should be provided are lost. In fact, the moisture loss from soil under fiber is actually greater than that from a properly prepared seedbed without mulch.

Where wood fiber and seed are mixed, most of the seed is found suspended in the fibers above the soil where germination is not possible without very high moisture conditions. If fertilizer is included in the mix, many burned seeds are found. Also, seed damage in the hydroseeder increases if more than 30 minutes of circulating is allowed.

Frequently, cut slopes are too hard and smooth for seed coverage by sloughing of soil. Fill slopes are, sometimes, too loose to hold moisture near the seed long enough for germination to take place. If either of these conditions exists and the mixing of wood fiber is used, the seed and fertilizer would be better left in the sacks and save the department the money. Some suggested methods for improvement of broadcast seeding technique are:

- Do not use wood fiber or similar mulch unless there is a special need such as immediate stabilization of an extremely loose soil, availability of other mulches, or on limited areas such as at the top or bottom of slopes that are inaccessible to application by mulch blowers.
- Separate each application of material and include proper seedbed preparation in the recommended sequence as follows:

Apply Fertilizer- Applied first to allow working into soil, and reduce loss.

Prepare Seedbed - Soil condition requirement should be similar to that obtained by walking a cleated crawler tractor up and down the slopes. The soil on the cut slopes should be loosened and the soil on fill slopes should be compacted, as well as leaving cross-slope basins for holding moisture in place.

Apply Seed - Apply uniformly and immediately after seedbed preparation by either wet or dry broadcast. The seed placed in the hydroseeder should be used within 30 minutes after the seed has been introduced in the water.

Apply Mulch - Depending on soil conditions, some delay before applying mulch may be beneficial as the wind and rain will slough soil to cover seed.

Remember, for most seeds to grow, the general rule is they must be just barely covered by moist soil for about a two-week period when soil temperature is above 10° C (50° F). Of course, survival of the seeding once the seed germinates depends on having selected the proper season of seeding and the right seed mix.

Season of Seeding

Selection of the proper season during which seeding work is permitted is a key item in ensuring successful seeding on construction projects. Even if all other specifications are correct, if the timing of the seeding is incorrect, the seedlings are likely to fail. There is constant pressure to widen the seasons that seeding work is permitted. The "best" time is usually a period of three to four weeks and it is wise to use "season" when planning roadside seeding. The contract special provisions contain the required dates for seeding based on average climatic and other conditions of the project location. The specifications allow for directed adjustment of these dates to allow for those times on a given project that the "season" comes a few days earlier or extends a few days later than specified. Deviation from the specified dates shall have the concurrence of the Construction Engineer.

Seed Mixtures

The seed mixtures specified normally include three grasses, one legume, and often natives. Each kind of seed has been selected because of its unique growth characteristics and the needs of the project. There are definite reasons for using the mixtures specified such as mature height seedling vigor, sod-forming or bunch type, site suitability, longevity, size of seed, and the interaction of the plants with each other after establishment. Any deviation from the mixtures specified, except for minor substitutions required when a seed order is filled by supply, must have the concurrence of the Construction Engineer.

Documentation for Pay Quantity

The diary shall be used to verify the activity, date, and location of the work. Payment will be made on plan quantities except for authorized additions or deletions. When the method of measurement is based on plan quantity, Subsection 109.01 of the Standard Specifications should be reviewed. If the Resident believes the plans are in error, a remeasurement of the area and adjustment of the pay quantity may be necessary. The contractor may also request a remeasure; and if quantities are found to be in error, the quantity should be adjusted.

622.00 PRECAST CONCRETE HEADGATES

The headgate locations are usually the weakest part of the ditch if good backfilling is not done. Care must be taken to provide solid bedding and good, dense material, free of any organic matter, shall be used for backfilling for the headgate.

Documentation for Pay Quantity

The diary shall be used to verify the activity, date, and location of the work and reporting quantities and final measurements. Right of Way agreements generally dictate the number and location.

CONSTRUCTION

Incidental

623.00

623.00 CONCRETE SLOPE PAVING

TO BE PUBLISHED SOON

624.00 RIPRAP

Riprap shall be placed to the dimensions shown on the plans and typical sections. Refer to the Standard Specifications if thickness is not shown on the plans. Slopes and toe trenches that will receive the riprap must be approved prior to placement of the stone. It may be necessary to cross-section or take three-dimensional measurement of the slopes and toe trench prior to placement of riprap to determine whether or not deficiencies exist in thickness or height. Riprap shall be computed from the staked dimensions.

Types of Riprap

Riprap has several types:

- **Loose Riprap and Hand-Placed Riprap** -- These types can use rock taken from the excavation, if permitted, and will be paid for as excavation and riprap. The material shall be replaced by the contractor and shall be at the contractor's expense when the excavation is needed for embankments or other similar requirements. The swell of the rock and shrink of the borrow must be taken into account when computing the replacement quantity. Subsection 104.07 of the Standard Specifications should be consulted when the above is undertaken.
- **Sack Riprap** -- This item will be produced using 10 MPa (Class 15) concrete. Care shall be taken to prevent placing in freezing weather if in a wetted condition. The concrete may need to be placed in the sacks in a dry state and dampened in place.
- **Concrete Stabilized Riprap** -- The type of concrete used to cover the riprap should be shown on the plans. No concrete shall be placed during freezing weather, and care shall be taken to protect the riprap from damage.

Make sure that the source for riprap is approved. Avoid haphazard dumping which may result in segregation. The finished riprap should be well keyed and present a regular surface having mass stability.

Documentation for Pay Quantities

Riprap, concrete, and structure excavation shall be calculated on a computation sheet or the diary. The diary shall be used to verify the activity, date, and location of the work. Quantities shall be computed to 0.1 cubic meter (0.1 of a cubic yard) and rounded off to the nearest cubic meter (cubic yard) on the estimate.

Reports

Concrete Delivery Ticket, DH-70, is to be completed for each truckload of concrete (see Concrete Manual for example). See Section 502, Construction manual for further details about concrete usage.

625.00 JOINTS

Joints in structures or concrete pavements and the related fillers normally consist of one of the following types:

Construction Joints -- are provided to enable the contractor to perform the work in reasonable size increments. When placed in a structure, metal reinforcement or dowel bars normally extend across the joint to tie the sections together. A vertically formed bulkhead must be used to hold the concrete to grade and provide resistance for consolidation. If a construction joint is not shown on the plans, then the Bridge section for structures should approve its location. Construction joints placed in concrete pavements may or may not require the placement of reinforcing steel or dowel bars depending on the design or location.

Contraction Joints -- allow for contraction or shrinkage of the concrete. When concrete sets, a small amount of shrinkage occurs and results in a tension stress that causes the concrete to crack. To achieve a more pleasing surface appearance in the finished concrete, contraction joints are preformed, tooled, or sawed at predetermined intervals. The theory being that the concrete will then crack in straight lines at the predetermined joints. To keep foreign matter from wedging into the preformed or sawed joints, they may be filled with a sealer or filler. Tooled joints, such as used in sidewalks, are not sealed; but the tooled joint must be of sufficient depth to control cracking. When the depth of a contraction joint is not specified, the general rule is that it should be at least one-third of the depth of the section of concrete.

Expansion Joints -- provide a clear space into which the concrete can expand without damaging or distorting adjacent material. Expansion joints allow for the expansion and other movement of bridge decks, curbs, sidewalks, etc. They are normally filled with a sealer, preformed expansion joint filler, or compression seal. The filler or seal must be firmly secured to the face of the joint or the action of the joint opening and closing will eventually work the material out of the joint. Expansion joints sometimes have dowels to tie the joined sections together. The portions of the dowels that are to allow movement must all be parallel and in the same plane. Improperly installed dowels will actually work as ties and prevent movement rather than allow movement and results in cracking of the connected sections. It is immaterial as to which end of a dowel is fastened and which end is free to move. Good practice is to have the fixed end of the dowel in whichever portion of the structure is poured first. This practice will allow minor alignment of the expansion end after the dowel is firmly held by the first pour and, thereby, insures proper positioning.

Expansion joints may also have "waterstops" installed to prevent water from flowing through the joint. The waterstop should be carefully installed and bonded into both panels being joined. It must be continuous for any particular joint to form a completely waterproof barrier.

The polymer silicone or similar sealers rely on its bonding properties to maintain the position in the joint. The joint surface must be clean. Sandblasting is one of the best methods to insure a clean surface. Sampling and testing requirements for the sealer are given in the Field Test manual.

Elastic joint fillers are cellular in cross-section and are of a rubber-like material. The elastic joint fillers normally come in coils or rolls and are inserted into the carefully prepared joint with the aid of a lubricant. Care must be exercised not to overstretch the filler.

Documentation for Pay Quantities

The inspector should keep proper records as to lot, joints sealed, surface conditions, and temperature. The cost for these items is included in the contract prices for structure or pavement items. The diary shall be used to verify the activity, date, and location of the work.

626.00 CONSTRUCTION TRAFFIC CONTROL DEVICES

Use of construction traffic control devices shall meet the requirements of the current Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD for Streets and Highways, published by the Federal Highway Administration and adopted by the Idaho Transportation Board, establishes the design and application of traffic control devices on all public roads in Idaho. Included in the MUTCD are requirements for traffic control devices to control and guide traffic through or around road and street construction, maintenance operations, and utility work.

The Idaho Transportation Department will furnish all route markers, route marker auxiliary panels, and guide signs. The contractor shall furnish all other construction traffic control devices required by the Engineer and as described in the MUTCD. At the preconstruction conference, the District should furnish the contractor standard sign charts illustrating typical construction signs required by the State on construction projects. These charts and standard highway drawings, which are available from the Traffic section, indicate typical signing schematics for various construction activities not explicitly covered by the MUTCD.

Normal design procedure is to establish pay items for certain types of traffic control devices on the construction contracts. However, the provisions of the MUTCD and Section 626 of the Standard Specifications apply to all construction, maintenance, and utility work regardless of the presence or absence of pay items established by the contract.

A contractor's or utility company's operations can change from day to day or even more frequently. Therefore, the Resident on projects where traffic interference is involved shall designate one person to work with the contractor or utility company daily in coordinating and tailoring traffic control to fit the work in progress. This person should be a trained traffic control inspector and should be familiar with all the construction traffic control requirements of the MUTCD and its supplements. The contractor or utility company should also designate an individual of comparable responsibility with whom the inspector can negotiate the solutions to traffic control problems. The District Traffic Engineer should review long-term traffic control schemes, detours, or especially critical traffic control problems. The ITD-1406, Construction Inspection Report, shall be used to document conformity of the traffic control provided on the project to the plans, the MUTCD requirements, and any approved modification of the Traffic Control Plan at the initiation of the traffic control operation and when changes are implemented. A nighttime review should be included to verify the visibility and adequacy of traffic control devices under the condition of darkness. Subsequent day and night reviews should be made by the Resident, or ITD staff, periodically and similarly documented in the project files using the ITD-1406.

Application of Traffic Control

The part of the MUTCD covering traffic controls for construction and maintenance operations establishes basic principles and prescribes standards for design, application, installation, and maintenance of the various types of traffic control devices. Because site conditions and work operations are so variable, the MUTCD does not attempt to prescribe types and sequences of devices applicable to various conditions and operations. The persons responsible for establishing traffic control plans must be capable of using good judgment in the selection of applicable devices and then using them in accordance with the provisions set forth by the MUTCD.

A well-designed traffic control plan normally must satisfy three basic requirements: (1) sufficient control devices must be provided in advance of the work area to adequately warn motorists; (2) adequate visibility and/or protection of the work area must be provided; and (3) the motorist must be guided through or around the work area. Consistency in device selection will aid greatly in this effort.

The Standard Specifications, Section 626, provide that payment may be made if bid items are established for several types of traffic control devices, including signs, barricades, drums, traffic signals, hazard identification beacons, vertical panels, advance warning arrow panels, and pavement striping tape. This specification, however, does not limit the types of traffic control devices for use on projects. Other devices such as barricade warning lights, floodlights or other types of illumination, traffic cones, delineators, and orange flags to supplement important warning signs devices may be desirable or even necessary. Payment for these auxiliary devices is provided under the item "Incidental Traffic Control Items."

In addition, guardrail, including "W" beam and concrete rail, although not a traffic control device, has considerable value in some traffic control schemes to protect both traffic and work areas.

Condition and Maintenance

Properly installed and maintained devices command the respect of motorists and greatly enhance the desired effect. Regardless of whether a traffic control device is covered by a pay item or its cost is incidental to other items, only those devices which are in good condition and meet the requirements of the MUTCD and specifications for color, size, design, intensity, reflectivity, etc. should be used on a project. Once installed on the project, the devices must be kept clean, in a good state of repair, and properly located and supported. The contract should be reviewed to determine if traffic control is to be monitored on a 24-hour basis.

Construction Signs Requirements

Reflectivity -- Sheeting on signs used for traffic control are specified to meet retroreflectivity requirements of either Class "A" or Class "B." Class "A" is enclosed lens retroreflective sheeting and is normally called engineering grade. Class "B" is referred to as high performance and is much more reflective than Class "A." Class "B" sheeting can be identified by patterns within the sheeting. Class "A" sheeting is void of any such pattern. Generally, the sheeting for red and orange signs will be Class "B," and the sheeting for white regulatory signs will be specified as Class "A." Questions regarding acceptability of retroreflective sheeting should be referred to the District Traffic Engineer.

Design -- The MUTCD provides information on the design of the most commonly used construction/maintenance warning signs. Legends other than those shown in the MUTCD may be used provided that the signs shall be of the same shape and color as standard signs of the same functional types. Symbols used on signs must be as provided for by the MUTCD. Sign sizes indicated in the MUTCD for standard signs are minimum allowable dimensions. Sizes may be increased by 150 mm (6-inch) increments with corresponding larger legends to provide larger signs as required to satisfy individual conditions.

Position, Mounting Height, Location, and Spacing -- These requirements are covered in some detail in the MUTCD. Some clarification, however, is necessary regarding the requirements on mounting heights. The MUTCD establishes basic mounting heights above road surface for primary signs at 1.5 meters (5 feet) for rural areas and a minimum of 2 meters (7 feet) for urban

areas. These standards apply to all primary signs with the exception that temporary signs may be mounted on portable supports a minimum of 0.3 meter (1 foot) above the road surface. Temporary signs shall be considered as only those signs that are required at one location for less than one week. Thus, if a sign is needed at a location for more than one week, the sign must be mounted either 1.5 or 2 meters (5 or 7 feet) above roadway elevation in accordance with the MUTCD. *The lower standard does not apply to Regulatory signs such as speed limit, stop signs, etc.*

Signs that are left in place when no longer applicable are as much of a problem as not having a needed sign. They may, in fact, create more resentment by motorists than the latter condition. Signs that no longer apply must be removed; or if the sign applies only intermittently, the sign may be covered or turned away from motorists' view when not required. The cover should be fabricated from material that is not a vapor barrier. Covers such as plastic garbage bags can cause damage during warm weather to the plastic reflective sheeting mounted on the sign.

Flagger Signs -- The proper sequence of signs that precede the flagger position is extremely important. The placement of warning signs needs to take into account the length of traffic backup rather than the location of the front of the vehicle queue. When the flagger is not required, the signs must be turned, covered, or removed.

Construction Barricades and Drums

- Reflectivity -- All barricades and drums shall be reflective orange and white, using Class "B" retroreflective sheeting, as specified in the bid schedule, or Class "B" if not specified.
- Function, Design, Construction, and Application --These requirements are covered in some detail by the MUTCD. Some items, however, need to be emphasized:
- Barricades shall be designed so that they do not present a hazard to errant vehicles that may strike them.
- Diagonal stripes on barricades shall slope downward in the direction traffic is intended to pass by the barricade.
- Drums or barricades should never be placed in the roadway without advance warning signs. Under conditions, such as severe curvature, heavy traffic volumes, etc., it may be advisable to use flashing beacons on single drums or barricades and steady burning lights on a series for night use.

Traffic Control Signal

Traffic control signals shall meet all the requirements specified by the MUTCD.

Hazard Identification Beacon

The MUTCD includes several specific requirements on size, mounting, visibility, flash rate, and lamp wattage under Section 4. Do not confuse a hazard identification beacon, which normally operates on 110 to 120 volts, 60 hz.A.C., with a battery-powered barricade warning light.

Advance Warning Arrow Panels

The primary application of the advance warning arrow panels is to assist in the diversion of traffic; i.e., lane closures on multilane highways and total diversion to an interchange ramp. The advance warning arrow panel is intended to supplement other devices required by the MUTCD, such as signs, barricades, drums, cones, etc. Advance warning arrow panels are not to be used as a turn arrow where no diversions or lane closures are involved.

The specifications require these devices to be capable of 50% dimming for night operation. This is necessary to reduce driver disability glare that would otherwise result from the 12 to 15 lamps operating at full-lamp voltage during hours of darkness.

Project plans will use advance warning arrow panels for lane closures and diversions on multilane highways when the designer anticipates the need for this device. However, if the job conditions or contractor operations later dictate lane closures or diversions on rural multilane roadways, a change order should be negotiated to establish the use and agreed price of this device. Very short time diversions and lane closures may not justify the use of advance warning arrow panels.

Temporary Pavement Striping Tape

The Standard Specifications adequately cover the materials requirements and application. The color of the striping tape shall be in accordance with the color requirements for permanent pavement markings, which are summarized as follows:

- Yellow separates opposing traffic.
- White delineates the separation of traffic flows in the same direction.
- White is also used for pavement marking legends and symbols.

The Resident should request the assistance of the District Traffic Engineer in laying out complex pavement marking schemes. Temporary pavement markings that no longer apply must be removed immediately. The specifications require marking of all new asphaltic surfaces, including leveling courses, scrub coats, ATB's, and surfacing courses on a daily basis. Unless provided otherwise, state personnel will be responsible for temporary markings on new seal coats and surface treatments. The markings shall be applied to seal coats and surface treatments immediately following brooming. Paint may be used in lieu of temporary striping tape if the striping tape will not adhere to the surface.

Traffic Control Maintenance

The item "Traffic Control Maintenance" is provided on projects that include traffic control devices. This bid item complements other traffic control devices and is intended to pay for: relocation and maintenance of devices, including incidental traffic control items, paid for or rented under other bid items, and costs associated with providing full-time monitoring and surveillance of traffic control devices.

The traffic control plans and/or special provisions will specify the type of special monitoring and surveillance required if extra attention to these matters is considered necessary due to high traffic volumes, higher speeds, etc. The contractor should not be expected to furnish personnel for this activity on a full-time basis unless the plans and specifications explicitly include this requirement.

Regulatory Speed Control Zones

Reduced speed zones are often appropriate due to roadway or lane constrictions, temporary surfaces, alignment revisions, construction activity interference, and numerous other reasons. A reduced speed limit should be based on good judgment, experience, and evaluation of geometrics and should not be based merely on the idea that such action will absolve the State or contractor of any responsibility in case of accidents. These procedures shall be followed on all projects requiring special speed zones regardless of the origin of the request or requirement. Projects including detailed traffic control plans that show reduced speed zones shall be handled in the same manner as those projects on which speed zone requests originate on the job.

Prior to establishing reduced speed zones through construction projects, some important considerations should be evaluated:

- Is there another feasible and possibly better alternative than reducing the speed limit? Studies have indicated that generally fewer accidents are likely to occur if traffic can be safely accommodated at the prevailing speed limit.
- Based on previous experience, can a reduced speed limit be enforced by a reasonable or normal level of law enforcement?
- If roadway alignment is one of the factors involved in the need to reduce speed, has safe speed been determined by sight distance determinations and by ball bank indicator measurement on horizontal curves?
- Can the reduction in speed be held to a maximum of 15 km/h (10 mph) less than the normal posted speed?

Transportation Board Policy B-12-03, Traffic Minute Entries, and the corresponding Administrative Policy A-12-03 give the District Engineer the authority to establish special speed regulations through construction and maintenance zones on the state highway system. This shall be accomplished by letters signed by the District Engineer and directed to the District Lieutenant of the Idaho State Police and local law enforcement agencies stating the special construction zone speed limit, the location, the date it will become effective, and any special application (i.e., during working hours only). Copies of the letter shall be furnished to the Resident, Central and District Files, Traffic Engineer, Construction Engineer, and the contractor. When the construction speed zone is removed, a follow-up letter from the District Engineer shall be sent to the law enforcement agencies informing them of the reversion to the normal speed limit.

Establishment of reduced construction speed zones on locally sponsored projects not on the state highway system shall be accomplished with approval of the appropriate governing body.

State-Furnished Signs

The specifications indicate that certain guide and regulatory signs will be furnished by the State and is intended to apply to regulatory and guide signs which are presently installed within the project limits and the construction operations requiring relocation of these signs. However, because some guide signs are difficult to acquire on short notice, the State will also furnish temporary destination signs and route markers.

Traffic Control Plans

The department's intention is that every highway construction project plan includes a Traffic Control Plan (TCP). The TCP will vary in complexity and impact on project costs depending on the type of construction and the speed and volume of traffic to be accommodated. The following department policies and information detail the key elements of the TCP:

A-12-04, Traffic Control During Construction, Maintenance, Utility, or Private Development Operations -- Key elements of this policy regarding construction projects are that:

- A traffic control plan that enhances the safety and efficiency of traffic movement is included in the construction contract.
- Work zone traffic delays should not exceed 10 minutes per stop or total interruption exceeds 15 minutes.
- On four-lane roads, at least one lane in each direction should be maintained to allow free flow.
- Limitation of contractors' operations and traffic delays during periods of peak traffic volumes.
- An inspector shall be assigned to monitor traffic control features when traffic must be maintained through all or part of a construction project.

Design Manual, Preliminary Design, subsection 4.12 -- set forth procedures on TCP items including development, widths, two-lane-two-way operation, signing and channelization, construction crossovers, and bid items.

The above-described policies and procedures cannot be enforced with the contractor unless appropriately adopted by the contract. However, if the designers have neglected including provisions as required by policy or if contract changes are made that may require employment of the described policies, a change order must be prepared to incorporate provision of the applicable policies.

Further TCP's may be revised at the request of the department or the contractor to provide for a more efficient plan or to accommodate revised work or a contractor proposal to pursue project construction in a manner different than anticipated by the designer. Major revisions in TCP's shall be accomplished only after a contract change order allowing the revision is approved. Alternate TCP's will be evaluated for acceptance on the basis of equality of safety and traffic accommodation and cost as compared to the originally planned TCP.

Documentation for Determining Pay Quantities

The furnishing of traffic control devices by a subcontractor or by the contractor has no bearing on how payment under this item is administered. No payment shall be made for devices that do not conform to the MUTCD. Exception to the MUTCD could include, but not be limited to, installation height and spacing, reflectivity at night and sign face condition. Construction operations are not to begin until the engineer approves traffic control devices.

For ease in calculating, the standard sign charts list the square foot quantity of each sign. The ledger will summarize the total quantity of the item and reference the diary and charts as the source documents. Quantities shall be computed to 1000 sq. mm (.01 of a S.F.) and rounded to the nearest 10 000 sq. mm (0.1 of a S.F.) on the estimate.

The specifications state that after a traffic control device is paid for, the device is available for use on the project(s) through the life of the contract, at no additional cost to the State, for repairing or replacing it. The inspector assigned to traffic control on the project should number and date each sign, barricade, or drum as it arrives on the project to aid in maintaining an inventory for payment. The Traffic Control Maintenance item reimburses the contractor for handling, etc., once the device has been employed.

If the engineer approves removal of all construction traffic control devices from the project(s), and the devices are later necessary, payment for the devices could be charged again. The engineer should evaluate traffic control device requirements on subsequent phases of construction prior to authorizing removal upon partial completion of the project.

The diary shall be used to verify the location and type of temporary construction traffic control devices placed on the roadway. The diary shall also be used to verify traffic control maintenance, date, and explanation of work performed. Tickets or the ITD-270A or ITD-270B Weekly Force Account sheets would be acceptable documents on a daily basis. Regardless of the means of documentation, concurrence on a daily basis of quantities shall be verified by the contractor's representative's initials along with the engineer's representative's initials on the source document. According to the specifications, traffic control maintenance will be measured and paid for by the hours of authorized traffic control maintenance. Hours of traffic control maintenance shall be reported to the nearest 0.5 hour. Any overtime for traffic control maintenance has no bearing when reporting hours worked for contractor payment. When a flagperson sets up signs, that period of time will be paid as traffic control maintenance. There will be no payment for flagging during that same period of time.

Reports

Following project completion, the engineer shall prepare an ITD-2764, need name not in ITD forms list to send to the Traffic Engineer covering the general traffic control schemes that were employed through the duration of the project construction. The report shall address the effectiveness of the various traffic control plans used, compare in tabular form the plan quantity of traffic control items vs. final quantities, and include recommendations for improvement. Additionally, the report shall include the following information concerning each vehicular accident that occurred on the project.

- A brief description of the accident.
- The date, time of day, and location of the accident. Location should be noted by new project milepost carried to the nearest 15 meters (one-hundredth mile), if possible.
- The type of construction activity underway at the accident site.

Copies of this report shall be furnished to Central and District Files, the District Traffic Engineer, District Design Engineer, Construction Engineer, and Employee Safety/Risk Management Manager.

627.00 PAINTING

Each District Materials Engineer has the Pictorial Surface Preparation Standards for Painting Steel Surfaces,” as well as the Steel Structures Painting Manual, Volume I, "Good Painting Practice,” for reference material. Each District Materials Engineer also has a copy of Section 2, "Surface Preparation Specifications,” from Steel Structures Painting Manual, Volume II. These three guides will be of great assistance in eliminating painting problems.

Painting must be performed under clean, dry conditions. Moisture on the surface will be trapped by the paint and prevent bonding. Moisture or dust in the air will cause a speckled or blotchy appearance. Cold weather also inhibits good bonding of the paint.

The new paint systems must be applied in accordance with the paint manufacturer's recommendations utilizing proper pressures, paint guns, nozzles, etc. Because of the quick drying nature of some paints, the gun must be held close enough to the metal to get the paint to the metal in a moist condition and thereby ensure a sealing coat. Several conditions of improper application, thinning, temperature (too high, too low), etc. can arise that will allow the paint to dry or be nearly dry upon contact with the metal. These undesirable conditions must be corrected immediately.

The painting must follow the sandblasting as quickly as possible. Generally, anything sandblasted one day should be painted with the prime coat the same day unless inside dry storage of the structural steel is utilized. If dew, rain, or other moist conditions dampen the near-white sandblasted steel surface, immediate rusting will occur, and the metal would require sandblasting again.

Painting of the concrete will only be required when noted in the special provisions or on the plans. The concrete surface preparation shall be an "ordinary surface finish", as stated under subsection 502.15 of the Standard Specifications. The concrete shall be cured by one of the following methods: water, form, steam, or with an acrylic modified curing compound in accordance with Subsection 502.16 of the Standard Specifications.

Documentation for Pay Quantity

Paint removal, disposal, and new painting specifications are changing because of environmental and personnel safety concerns. Field staff should thoroughly review each contract specification when involved in inspection of this type of work.

When the paint arrives at the job site, the inspector must check that the specified paint formula and system is being used.

Inspection of steel that has been cleaned by sandblasting should verify that the surface meets the specified color or preparation. To ensure the proper thickness of paint on the steel surface, the dry film mil thickness shall be checked by means of a gauge or meter. The inspector should document where the depth checks were made and choose checkpoints so as to check all types of surfaces.

Painting will not be paid for separately unless otherwise provided.

The diary shall be used to verify the activity, date, and location of the work and may be used for reporting final quantities when painting is a pay item.

629.00 MOBILIZATION

Mobilization is an item to allow the contractor to be reimbursed for monies spent to initiate the start of a project and for the continued administration and necessary bonding, etc.

Documentation for Determining Pay Quantities

Subsection 629.02 of the Standard Specification is quite explicit on how the contractor is to receive payment for the mobilization bid item. This specification does not allow payment for mobilization to exceed 10% of the total contract amount until completion of the project.

630.00 FLAGGING AND PILOT CARS

Flagpersons furnished by the contractor to control traffic shall be trained and have a valid flagpersons card. Idaho's cards are valid for three (3) years from the date of issue. Other state's flagperson cards may be accepted provided the card has been issued during the past three years. The flagperson's card should be verified and documented by diary entry, recording the card number and the state that issued the card.

Flagging equipment, as described in the department's Flagging Manual, shall be used.

All pilot cars shall be equipped with the proper sign, as designated in the Manual on Uniform Traffic Control Devices, and be properly mounted. The vehicles used for piloting shall be in good running condition and be equipped with a roof-mounted, high-intensity, rotating or strobe type amber flasher.

Documentation for Determining Pay Quantities

The diary shall be used to verify the activity, date, and location of the work. Tickets or ITD-270A or ITD-270B, Weekly Force Account sheets would be acceptable documents on a daily basis. Regardless of the means of documentation, concurrence on a daily basis of quantities should be verified by the contractor's representative's initials along with the engineer's representative's initials on the source document.

According to the specifications, flagging will be measured and paid for by the hour of authorized flagging and pilot car by the hour of authorized operation, i.e., if two pilot cars were authorized for six hours each, the pay quantity for that day would be 12 hours. Similarly, if two flaggers must flag traffic for an 8-hour period, payment is made for a total of 16 hours even though a third flagger may have been employed for relief. Hours that are authorized for flagging and pilot car operation shall not include show up time or standby time. Hours of flagging and pilot car operation shall be reported to the nearest 0.5 hour. Any overtime for flaggers or pilot car operations have no bearing when reporting hours worked for contractor payment. Paddle and pilot car operating time are by pay units, not payroll hours.

631.00 CONSTRUCTION MAINTENANCE DURING WINTER SUSPENSION

If winter maintenance is required for a construction project, a pre-suspension meeting shall be held between the engineer and the contractor to determine the level of maintenance on the roadway during suspension. The equipment, work force, and materials necessary for the maintenance will be determined at this time. All equipment being used and paid for shall be available at all time and materials necessary for repairs shall be readily available.

All actual loaded labor costs to the contractor for this work shall be paid for, including travel time (actual costs).

Payment for any work accomplished by a piece of equipment during a one-month period will not amount to less than the equivalency of 100% of the owner's monthly equity rate.

Documentation for Pay Quantities

The diary shall be used to verify the activity, date, and location of the work. Weekly force account sheets should be kept in duplicate and signed by both parties.